

A Multilevel Hierarchical Addressing and Routing Mechanism for High-Speed Internet

Abstract: A multilevel hierarchical addressing and routing mechanism for high-speed Internet is presented. The presented mechanism enables an Internet router to make its packet forwarding decision based on a short, fixed-length block of the IP address. This short, fixed-length block can be used as an index to an entry in the routing table. This will significantly speed up the packet forwarding and routing procedure, which is crucial for the future high-speed Internet.

The data transfer speed of the Internet is getting higher and higher. To be able to forward packets at the line speed, a fast packet-forwarding technique is essential for the future high-speed Internet routers. The presented mechanism will enable the future high-speed Internet routers to forward packets at the increasing line speed.

The Internet can be logically viewed as a multilevel hierarchical network. Based on a multilevel view of the Internet, the IP address can be grouped into short, fixed-length blocks. On top of a multilevel view of the Internet and the corresponding grouping of the IP address, a multilevel hierarchical routing mechanism is developed. Using this hierarchical routing mechanism, a router can make its packet forwarding decision based on a short, fixed-length block of the IP address, not the whole IP address. This short, fixed-length block of an IP address can be used as an index to an entry in the routing table. Therefore, the presented mechanism will significantly reduce the packet forwarding time.

Institutions may change their ISPs from time to time. After switching to a new ISP, an institution will get new IP addresses from the new ISP. But this institution may prefer to keep its old IP addresses for its hosts. In this case, an address translator at the edge of the institution's network can be implemented to translate between the corresponding old and new IP addresses for this institution.

The presented mechanism is simple and straightforward, so that it can be implemented using hardware. The hardware implementation will further speed up the address-lookup procedure. Finally, the present invention does not require any topology or connection change to the current Internet.